Parallel Scaleable Programming Environment: Debuggers and Performance Monitors

In a balanced computational environment, hardware and software improvements have contributed equally to the increase in applications performance. What matters most is the shortest time to solution. Code development efforts are definitely on the critical path to success. We are focusing on reaching ultra-scale performance levels, suitable for solving large-scale complex problems. The fully integrated heterogeneous, multi-vendor parallel computing environments we are considering pose considerable challenges from an application programming point of view. Codeor threads of control. These tools have to be able to relate debugging information back to the source code. Because these tools are intended to be used on 10-to-30 TFLOPS systems with up to 10-to-30 TBytes of RAM, a similarly large amount of data must possibly be dealt with in a debugg collection of computer systems in its entirety. This support has to include message passing and shared memory environments, as well as a combination thereof.

Opportunities exist to adapt and develop an integrated, scaleable, high-performance parallel debugger and performance monitor architecture and software which are portable and function effectively across distributed platforms with up to approximately 10,000 processors, corresponding to millions of simultaneous processes or threads of control. These tools have to be able to relate debugging information back to the source code. Because these tools are intended to be used on 10-to-30 TFLOPS systems with up to 10-to-30 TBytes of RAM, a similarly large amount of data must possibly be dealt with in a debugging context. Ease of use, graphical representations of data in multiple dimensions, and high-performance parparallel data access by these tools seem to be essential ingredients. debugger and performance monitor tools have also to support MPI and POSIX threads. The software has to function on top of the distributed parallel operating system software described above. However, this activity is not intended to solve distributed computing or the problem solving environment.